Interstate Technical Group on Abandoned Underground Mines
Sixth Biennial Abandoned Underground Mine Workshop

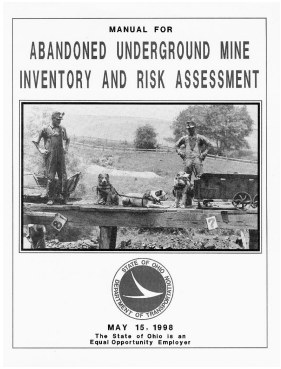
Update of Abandoned Underground Mine Activities in Ohio

Ohio Department of Transportation
Office of Geotechnical Engineering

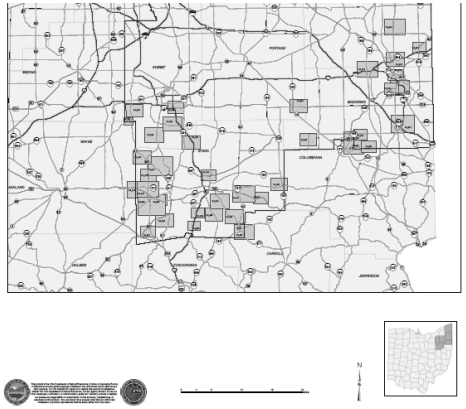
Progress to Date

- The AUMIRA statewide GIS database has been populated with data for approximately 600 sites (data for some sites is still under development).
- The future development of a new layer of GIS points confirming the recorded presence of abandoned underground mines is expected to add as many as 500 additional AUMIRA sites to the statewide inventory. These additional sites, if confirmed, could elevate the projected statewide total number of AUMIRA sites to approximately 1600.
- A consultant has been chosen to develop the new statewide layer of GIS mine points and to complete the population of the state-wide database. Strategic Planning and Research funding has been requested within ODOT in support of this database population effort.
- The AUMIRA work is competing with higher priority work, such as major new projects and maintenance projects, for the limited amount of staff time available for all operations.

Abandoned Underground Mine Inventory and Risk Assessment (AUMIRA)



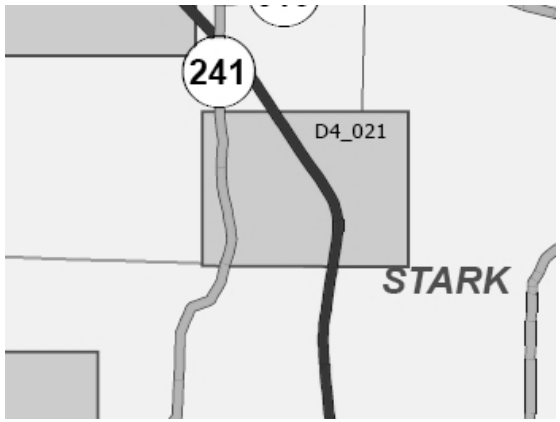
Geo-Referenced Mine Maps



Ohio Department of Natural Resources, Geological Survey has completed their assistance to the ODOT AUMIRA effort through the geo-referencing of mine map TIF image files which were previously made available by the US Department of Interior, Office of Surface Mining National Mine Map Repository in Pittsburgh, PA.

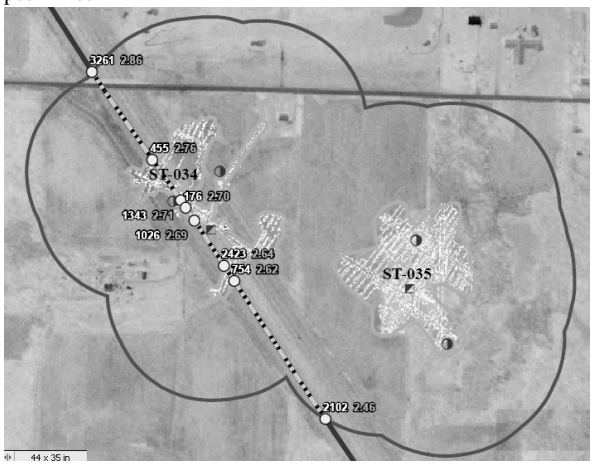
District 4 Mine Scene Index

The Mine Map Scene Indexing

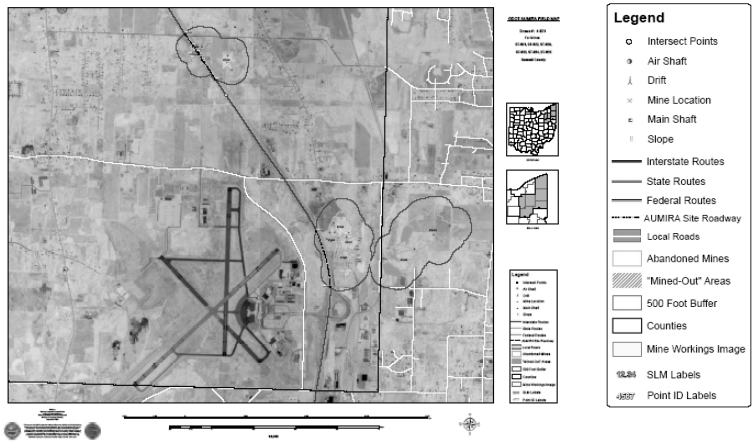


The District Mine Scene Index provides location and scene numbers

Enlargement of AUMIRA site locations, including 500 foot buffering around mapped mines



Individual Mine Scene



ODOT Research for FY2006 – FY2007

Sonar Imaging of Flooded Subsurface Voids

PROBLEM STATEMENT

• Many of Ohio's roadways are subject to subsidence or settlement due to the presence of subsurface voids.

•Voids may be associated with past underground mining activities for coal, clay, limestone, and gypsum.

• Voids may also have been created through natural dissolution of bedrock as with karst formations.

•Voids are frequently flooded.

• Borehole camera viewing of voids is greatly inhibited by turbid waters created through the drilling process. The borehole camera's lights are reflected reducing viewing distance to near zero.

• This research project will explore the use of sonar in combination with video to develop 2D and 3D images of the flooded subsurface voids.

PROPOSED ODOT RESEARCH:

•Phase 1: Conduct a feasibility study

•Phase 2: Develop and test a practical, borehole viewing system that will provide real-time video and sonar data of flooded subsurface voids.

SYSTEM CHARACTERISTICS

• Capable of reaching and operating at depths of 300 feet with full inundation.

• Capable of real time monitoring with the capacity to record all pertinent information (e.g., depth, orientation, distance) and images.

• Sensitive enough to identify timbers, pillars, roof falls, etc. When possible, the system's components shall be off-the-shelf.

Some mine voids are flooded or partially flooded.

Emergency Mine Remediation Projects,

Site Investigations,

Project Designs, and

Roadway Construction Projects

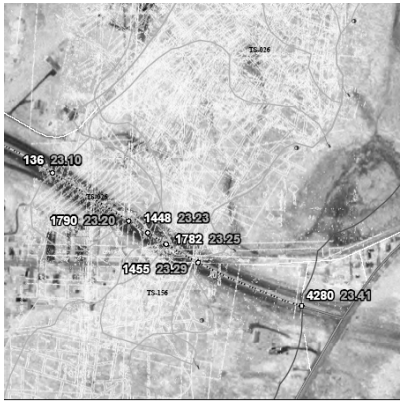
Ohio State Route 93 Emergency Mine Remediation Project

- Perry County
- 2-lane state route
- Response to ODNR AML program reports of coal mine subsidence beyond both sides of the roadway
- No mine maps available
- Project length 450 feet
- Remediation method Drilling and grouting. 162 Cu. Yds. Class C concrete placed
- Project Cost: Approx. $23, 000

State Route 711 Mine Remediation

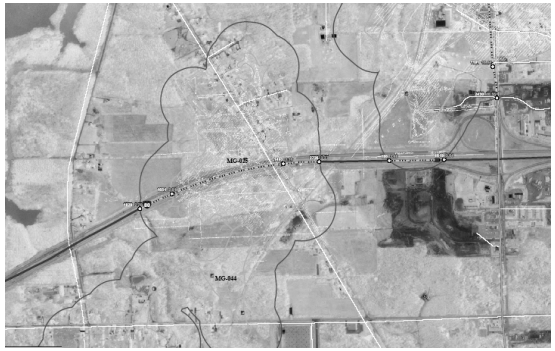
- Major New Design and Construction on a New Alignment
- Mahoning and Trumbell Counties
- Limited Assess Connector
- Numerous mapped and unmapped abandoned underground coal mines and an abandoned surface quarry
- Mine remediation included
  - Drilling and grouting mine voids on a the new alignment
  - Double cased drilled piers founded below the mined interval to function as the foundation for a new over passing structure.
- Approximate cost of Construction: $3.8 million

U.S. 250 Emergency Mine Remediation Project



- Tuscarawas County
- Limited Assess Rural Connector
- Mapped and unmapped Abandoned Underground Clay Mines
- Mine remediation method was excavation of 10 to 20 feet of overburden and backfilling.
- Approximate cost of Construction: $1 million

Interstate 80



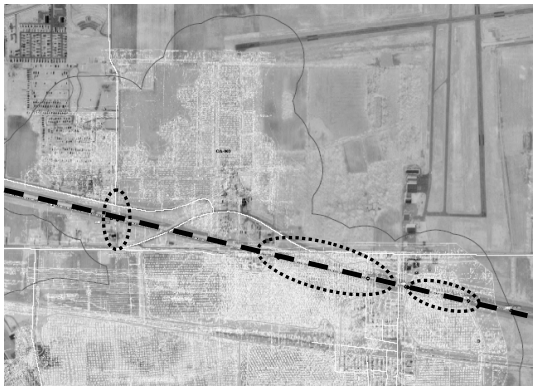
- Major New Project to add lanes and remediate mines
- Mahoning County Limited Assess Connector
- Mine remediation included drilling and grouting mapped and unmapped abandoned underground mine voids.
- Approximate cost of mine remediation Construction: $1.5 million

Major New Design on New Alignment

State Route 93

- **Muskingum County**
- **5.1 miles of new alignment**
- **31 acres of Abandoned Underground Mines**
- **17 acres of Abandoned Surface Mines**
- **Estimated Cost of Construction = $28.4 Million**
  - **Vertical alignment was lowered to below the coal creating an unbalanced earthwork quantity of 2.1 million cubic yards**
  - **Cut slopes through strip mines will be 3H:1V**
  - **Cost does not include provisions to deal with mine exposed in the cut slopes, AMD, etc.**

District 2 Mines Investigation (Ohio State Route 2)



- **Mine Investigation in response to subsidence activity on adjacent properties**
- **Ottawa County limited assess rural connector**

Major New Design on New Alignment

U.S. Route 33 (Nelsonville, Ohio By-Pass)

- **Hocking and Athens Counties**
- **9 mile new alignment**
- **Numerous Abandoned Underground Mines and Abandoned Surface Mines**
- **Construction to Begin in 2007**
- **Estimated cost of Construction = $190 Million, including an estimated $25 to $50 Million for abandoned mine remediation**

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